$P\{|X| \le \sigma\} = 2\Phi(1) - 1$

$= 2(.8413) - 1 = \boxed{0.6826}$

$P\{|X| \le 2\sigma\} = 2\Phi(2) - 1$

$2(.9772) - 1 = \boxed{0.9544}$

$P\{|X| \le 3\sigma\} = 2\Phi(3) - 1$

$= 2(.9986) - 1 = \boxed{0.9972}$

(3)

$N(np, np(1-p)) = N(2, 1.96)$

(i) $P(\bar{x} = 4) = P\left(\frac{3.5-2}{\sqrt{1.46}} \le Z \le \frac{4.5-2}{\sqrt{1.46}}\right) =$

$P\left(z \le \frac{2.5}{1.4}\right) - P\left(z \le \frac{1.5}{1.4}\right) = P(z < 1.79) - P(z < 1.01)$

$.9632 - .8576 = \boxed{.1056}$

(ii) $P(x \le 4) = P\left(z \le \frac{4.5-2}{\sqrt{1.46}}\right) = P\left(z < \frac{2.5}{1.4}\right) = P(z < 1.79$

$= \boxed{.9632}$

(4)

		1/4	1/2	1/4
	X \ Y	0	1	2
1/3	0	1/12	1/6	1/12
1/3	1	1/12	1/6	1/12
1/3	2	1/12	1/6	1/12

Finding EZ

$P(Z = 0) = \frac{1}{12}$

$P(Z = 1) = P(X = 0, Y = 1) + P(X = 1, Y = 0) = \frac{1}{6} + \frac{1}{12} = \frac{1}{4}$

$P(Z = 2) = \frac{1}{12} + \frac{1}{12} + \frac{1}{6} = \frac{1}{3}$

$P(Z = 3) = \frac{1}{12} + \frac{1}{6} = \frac{1}{4}$, $P(Z = 4) = \frac{1}{12}$

z	0	1	2	3	4
$P(z)$	.083	.25	.333	.25	.083

$E(Z) = 0(.083) + 1(.25) + 2(.333) + 3(.25) + 4(.083)$

$= \boxed{2}$